[0030] In one embodiment, haptic effects can be applied to various menu navigation steps. For a user holding a hand held haptic enabled device, the haptics can be directed to the housing such that the user's hand holding the device will experience the haptic effect. For example, when using a touchscreen, if the user hovers over a top level menu choice and a sub-menu exists for that choice, then a light haptic effect simulating a soft button click (first haptic effect) can be played as the graphics display the preview sub-menu items. If there is no sub-menu attached to that particular menu item (or no valid choices exist) then a second haptic effect can be generated, for example a buzz created by series of pulses. If the user then selects the top level menu item, a strong haptic effect simulating a sharp button click (third haptic effect) can be played. If the user decides to move to another top-level menu a fourth haptic effect can be played when entering the new menu. The fourth haptic effect can be the same as the first haptic effect if it is a similar menu item. These haptic effects, resulting while a user finger is still hovering over a surface, i.e., before contract has been made, would be directed to the other hand that is holding the haptic device.

[0031] In one embodiment, different haptic effects can be applied depending on the intended use of the touchscreen area. For example, when a user's finger is hovering over a touch screen integrated into a cell phone or PDA, different haptic effects can be produced in the cell phone when in a map/GPS navigation mode than when managing climate control or when entering hand written notes.

[0032] In one embodiment, during typical operation of a cell phone, the user can have many different proximity relationships to the device. For example the cell phone could be in the user's hand, in the user's pocket, or right next to the user's face. These different operating conditions required different levels of haptic feedback to the user. A proximity sensor could be used to detect these different operating conditions. It is also possible to detect these user conditions through the use of acceleration and/or orientation measurements. Once the current operating condition of the device is known, for example holding the phone next to an ear, a global haptic volume adjustment could be made for the different operating states. In one example, the user could have a specific vibration pattern set for a reminder event. If the user has the phone attached to a belt clip the vibration pattern could contain strong haptic effects in order to signal the reminder event. If the user is actually using the phone and has the phone pressed up next to the user's face where the user will be more sensitive to the haptic effects, when the reminder event is triggered, it would be useful to have the haptic magnitude reduced for that event.

[0033] In one embodiment, gestures can be recognized such as a virtual jog dial. A jog dial recognizes rotation and when performed above a proximity active surface can be recognized without the surface being touched. A movement in the x, y and/or z direction can also be recognized. As an example, haptic effects can be attached to the use of the virtual jog wheel. A first haptic effect can be played at regular intervals of the jog wheel to give the user an indication and confirmation of progress in moving the wheel. A second haptic effect can be output when the user reaches the end of a list that the jog wheel is controlling. These jog and/or x, y, z motions can be recognized even when performed with proximity sensing, over a mechanical alpha/numeric keypad such as which exists on most cell phones today.

[0034] Several embodiments disclosed are specifically illustrated and/or described herein. However, it will be appreciated that modifications and variations are covered by the above teachings and within the purview of the appended claims without departing from the spirit and intended scope of the invention.

What is claimed is:

1. A method of generating haptic effects on a device, said method comprising:
  detecting the presence of an object near an input area of the device; and
  generating a haptic effect on the device in response to the presence detection.

2. The method of claim 1, further comprising:
  determining the approximate time when the object will touch the input area; and
  generating the haptic effect so that it is implemented at approximately the same time as when the object touches the input area.

3. The method of claim 2, wherein said generating comprises energizing an actuator before the object touches the input area.

4. The method of claim 1, wherein said haptic effect comprises generating a vibration on the input area.

5. The method of claim 1, wherein said device comprises a housing and said haptic effect comprises generating a vibration on the housing.

6. The method of claim 1, wherein said device is a cellular telephone.

7. The method of claim 1, wherein said input area is a touch sensitive surface.

8. The method of claim 1, further comprising:
  determining a position of the object relative to the input area; and
  determining a functionality on the input area based on the position;
  wherein said generating the haptic effect comprises selecting a first type of the haptic effect based on the functionality.

9. The method of claim 8, wherein said generating the haptic effect comprises selecting a second type of the haptic effect based on the functionality, wherein said second type is different than said first type.

10. A haptically enabled device comprising:
  an input area;
  a proximity sensor coupled to said input area; and
  a haptic feedback system coupled to said input area.

11. The device of claim 10, wherein said proximity sensor is adapted to detect the presence of an object near the input area and said haptic feedback system is adapted to generate a haptic effect on the device in response to the presence detection.

12. The device of claim 11, wherein said haptic feedback system is adapted to determine the approximate time when the object will touch the input area; and
  generate the haptic effect so that it is implemented at approximately the same time as when the object touches the input area.

13. The device of claim 12, wherein said haptic feedback system comprises an actuator, and said system energizes said actuator before the object touches the input area.

14. The device of claim 10, wherein said input area comprises a touch sensitive surface.

15. The device of claim 14, wherein said touch sensitive surface is a touchscreen.